APIS Imaging Standards

The purpose of this document is to provide some guidelines to optimize the imaging process and encourage a more uniform visual presentation. The recommendations included here are what APIS considers useful. We realize, however, that resources and conditions will vary among institutions and projects, and this will affect what methods are employed and, of course, what results are achieved.

A. File Format: TIFF

All digital files should be saved as TIFF files with no compression.

TIFF (Tagged Image File Format) is the standard archival file format. It is one of the most widely supported file formats for storing bit mapped images.

B. Bit Depth

All RGB (color) files should have a bit depth of 24 bits.

Bit depth is a measure of how much tonal information is available in each pixel; the greater the bit depth, the greater the amount of tonal information. A pixel with a bit depth of 1 bit can display only two tonal values – black or white. A pixel with a bit depth of 8 bits has 256 possible tone values (2^8). A pixel with a bit depth of 24 bits has 2^{24}, or roughly 16 million, possible values. Common bit depths range from 1 to 64 bits per pixel.

Presently many scanning devices can produce RGB (color) files with bit depths greater than 24 bits. The standard advice is to scan at the highest bit depth allowed by a particular device. Bear in mind that higher bit depth increases file size. A 48 bit RGB file will be twice as large as a 24 bit file. Files created for the APIS Project should be at least 24 bits and can be higher at the discretion of the participating institution.

C. Capture Resolution

The resolution of the files should be no less than 600 pixels per inch (ppi).

At this resolution a person will be able to enlarge images on a computer screen to a size that will greatly facilitate study of the object. An image file with a pixel dimension of 6000 by 8000 pixels (ca. 144MB), which is equivalent to a 10 by about 13 inch papyrus captured at 600 ppi, is,

when viewed on a computer monitor, equivalent to a 24 by 30 inch print viewed from 10 inches away!

D. Use of Targets

The digital image file of each papyrus (or section of a papyrus) should include standard reference targets to provide documentation of the conditions of image capture. The targets should include a ruler (in centimeters), a grayscale and a set of standard color patches.

An ideal set of reference targets is the Kodak Color Separation Guide and Grayscale (Q-13). The Q-13 set consists of two standard targets; each one measures about 8 by 2.4 inches. The first target is a 20-step grayscale, with an increase in density of (nominally) 0.10 density units for each successively darker patch. The grayscale target also includes a ruler (inches and cm). The second target contains standard color patches (primaries, white, and black). The Q-14 set is a larger version of the same targets.

The Kodak Q-13 (and Q-14) targets can be combined to form a single unit that can be placed on the long edge of the image. The grayscale, color patches and ruler can be cut and stacked so that only ½ inch of the long edge of each target is visible (see figure below).
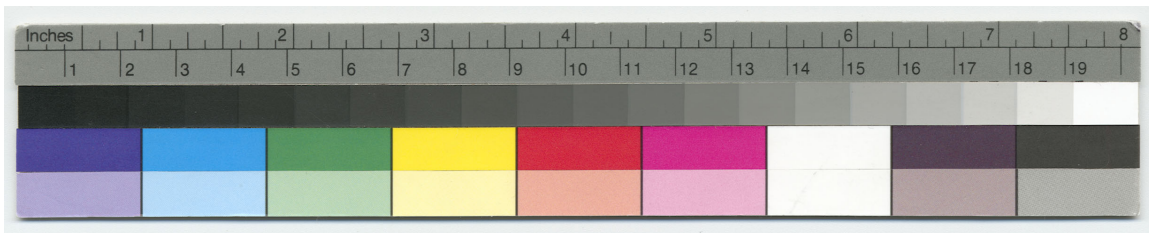

It is a good idea to record the date of first use on the back of the assembled Q-13 target for identification purposes and to know when it is time to replace the target. It is recommended that targets be replaced periodically, since they are made of paper and thus prone to bending, fading and soiling.

E. Image Composition

For imaging papyri a white background is preferable, in order to offer the most legible images possible. For institutions using flatbed scanners, placing a sheet of white paper over the papyrus will give the desired background.

We recommend that ostraca be imaged against a non-white background (see below). Each object should be scanned so that the resulting image can be viewed without having to rotate it. The targets should be placed along one of the long edges, no less than ½ inch from the object.
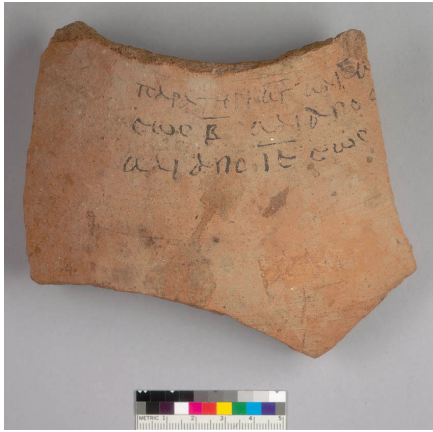
An example of an ostracon imaged against a medium gray background with a Phaseone scan back and fluorescent lights
*(Courtesy U. of Calif., Berkeley)*
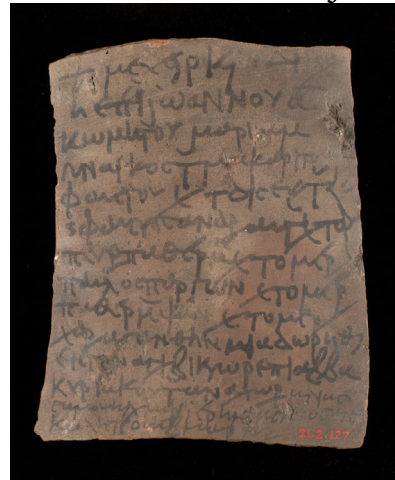
An example of an ostracon imaged against a black background.
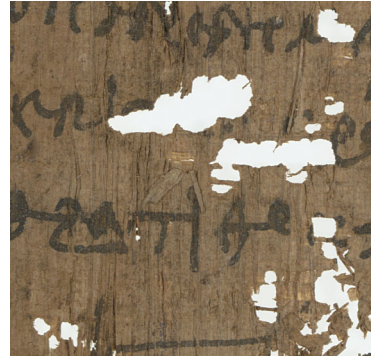
F. Lighting

It is common practice to sandwich papyri between sheets of glass. Even if the papyri are between glass the photographer can light them using standard flat copy lighting. This standard technique uses four lights at the sides of a vertical copy stand, with two lights on each side directed down toward the copy board at a 45 degree angle. This arrangement provides uniform illumination over a wide area, and minimizes surface reflections from shiny originals (or from cover glass) at the camera position.

The glass supporting a papyrus creates a space between the papyrus and the background which causes shadows to appear in the areas of the papyrus that have holes. A solution to this problem is to backlight the papyrus using either a conventional, color-balanced light table or a still life shooting table with a Plexiglas surface or similar setup. Careful attention must be paid to the lighting so that the backlights do not overwhelm the lights illuminating the front of the papyrus. When properly done the background should have the appearance of white paper (see example below).
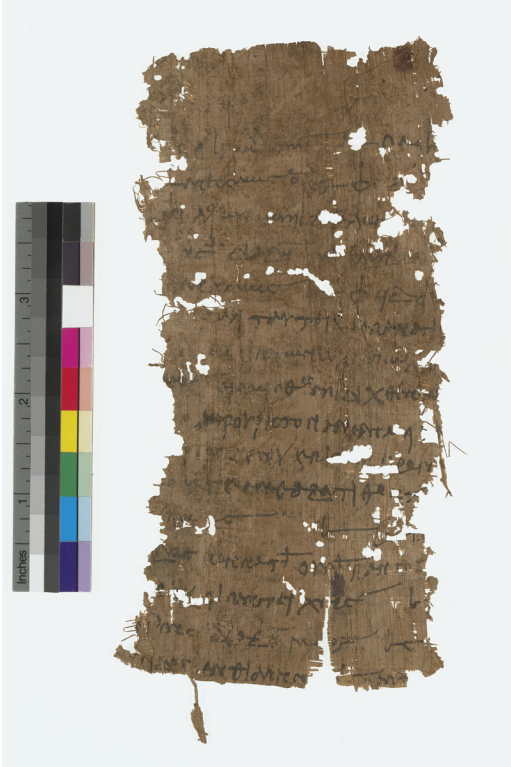
At left is an example of a papyrus backlit to illuminate shadows caused by the spacing between the glass and the surface of the copy stand.

Above is a detail of the papyrus that shows a section with holes. Note the lack of shadows.

Lighting for ostraca or lead/wooden tablets will be similar to that for papyri. Although these objects have greater depth than papyri, the main focus is still on the writing surface and not on the whole object. The standard copy lighting setup should normally work very well (see examples in Section E above).

G. File Naming

In cases where Columbia University is hosting images on behalf of a participating institution, the following file naming convention is to be used:

Columbia University APIS File Naming Convention

Files will have several components separated by periods. Components are not optional. The general form is:

institution.project.item.f/b.x-y.res.format

Where:

institution is the participating institution's name (e.g. "columbia")

project is always "apis"

item is the APIS number assigned by the cataloger with no leading zeros. Images of papyri always begin with "p;" APIS numbers for ostraca ***do not*** begin with "o" or any other letter.

f/b is "f" or "b", and specifies the front or back of an object. Use "f" if there is only one side.

x-y indicates a segment of a document in a grid of maximum size 10x10. Coordinates start at 0-0 at the left-top, e.g., 1-2 is the second column and third row (there is no implied scale). Coordinates are used only when scanning a large object in tiles (or sections), in order to indicate placement.

The grid system is:

0-0	1-0	2-0	3-0	...	9-0
0-1	1-1	2-1	3-1	...	9-1
0-2	1-2	2-2	3-2	...	9-2
0-3	1-3	2-3	3-3	...	9-3
...					
0-9	1-9	2-9	3-9	...	9-9

Use only as many contiguous blocks as you need, starting with 0-0. If the object has not been imaged in sections, use 0.

res is the resolution in ppi, e.g., "600." When the image is for convenience rather than archiving, enter "na" for the resolution, such as for a shot of a whole document when there are also multiple segment images.

Note: Original tiff scans should, in each case, be labeled "600;" during the process of creating derivatives, the correct image resolution will be inserted.

format is the file encoding (type), e.g., "gif," "tif," "jpg"

Examples (made up). Note: all characters must be lowercase.

columbia.apis.883.f.0.600.tif	a small piece (e.g. an ostracon), with no
columbia.apis.883.f.0.150.tif	tiling, at several resolutions
columbia.apis.883.f.0.72.tif	

columbia.apis.p5.f.0-0.600.tif columbia.apis.p5.f.0-1.600.tif columbia.apis.p5.f.0-2.600.tif	the front of a long vertical papyrus captured in 3 horizontal tiles
columbia.apis.p8.f.0-0.150.tif columbia.apis.p8.f.1-0.150.tif columbia.apis.p8.f.2-0.150.tif columbia.apis.p8.f.0.na.tif	a wide, one-sided papyrus captured in 3 vertical tiles, and an additional overview image containing the entire papyrus

Those institutions that will be hosting their own images may follow whatever file naming convention they wish. No matter what convention is adopted, it is important that persistent URLs are provided.

H. Derivative Creation

For the purpose of web presentation the following JPEG resolution sizes (with a medium compression level) are suggested:

Large: 300 ppi

Medium: 150 ppi

Small: 75 ppi

JPEG files are easily created with programs like Adobe Photoshop or Imagemagik. The process of making derivatives can be automated using either of these programs.

Some mild unsharp masking may improve the look of the jpeg derivatives. The following settings (in Photoshop) offer a good starting point: *Amount:* 100, *Radius:* 0.5, *Threshold:* 0

As a general rule, never manipulate archival files. Image manipulation should be done only on derivative images or on a service file created for that purpose.

A Note on Color and the Web:

It is common practice in a color managed environment to embed an ICC profile such as Adobe RGB or a locally created camera profile. When creating jpeg derivatives for the web it is best to remove these color space profiles and embed the sRGB color space. The default color space of the web is sRGB. An image file with a color space other than sRGB will

appear flat on the web. Image files with no color space associated (i.e. untagged RGB) will automatically default to sRGB on the web.

To demonstrate this, create three jpeg derivatives of the same image file and embed your preferred color space profile in the first jpeg (assuming it is not sRGB); then embed the sRGB color space in the second and leave the third untagged. Open each in any web browser by simply opening the browser and dragging the image file onto the browser screen. Do this with each file and note the differences. The untagged jpeg and the sRGB jpeg should look similar and should appear more like the original tiff than the first jpeg.

I. Summary of APIS Specifications

A. File Format:	TIFF
B. Bit Depth	24 bits
C. Resolution:	600 pixels per inch (ppi)
D. Targets:	Grayscale, color patches and ruler in centimeters—Kodak Q-13
E. Image Composition:	White background; upright image; targets along one of the long edges
F. File Naming:	The Columbia file naming convention is to be followed if images are being hosted by Columbia University. Otherwise, no specific conventions are necessary, but a persistent URL for each image file is required.
G. Derivatives:	JPEGs with a medium compression level and the following suggested resolutions: 300ppi, 150ppi, 75ppi

J. Contact

Any questions regarding imaging procedures should be addressed to:

Dave Ortiz
Digital Imaging Specialist
Columbia University
212-854-5519
dortiz@columbia.edu

Rodney Ast
APIS, Project Coordinator
Columbia University
212-854-8102
rla2118@columbia.edu